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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/560,828	04/28/2000	Heung-Yeung Shum	MS1-476US	4608

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LEE & HAYES PLLC  
421 W RIVERSIDE AVENUE SUITE 500  
SPOKANE, WA 99201

EXAMINER

JANKUS, ALMIS R

ART UNIT	PAPER NUMBER
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2671

DATE MAILED: 04/09/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

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# Office Action Summary

Application No.

09/560,828

Applicant(s)

SHUM ET AL.

Examiner

Almis R Jankus

Art Unit

2671

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 51-57 is/are allowed.
- 6) ☒ Claim(s) 1,2,5-10,15-17,21-24,28-34,38-47 and 50 is/are rejected.
- 7) ☒ Claim(s) 3,4,11-14,18-20,25-27,35-37,48 and 49 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4. 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

1. Claims 1-57 are presented for examination.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in

Art Unit: 2671

order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 2, 5-10, 15-17, 21-24, 28-34, 38-47, and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu et al.

Hsu et al. Rendered obvious claim 1 by teaching the claimed one or more computer-readable media having stored thereon a computer program that, when executed by one or more processors of the computer, causes the one or more processors to perform acts, at figure 2; identifying a plurality of viewing rays to be used to constructed a view image of a scene represented by a mosaic; checking whether each of the plurality of viewing rays coincides with at least a portion of a captured image; and for each viewing ray that coincides with at least a portion of a captured image, selecting the portion of the captured image; for each viewing ray that does not coincide with at least a portion of a captured image, generating an interpolated portion by interpolating between at least two portions of one or more captured images based on a constant distance to objects in the scene; and combining the selected and interpolated portions to generate the view image, at columns 18-19, and more specifically with the teaching of in the more realistic situation of finite sampling of the frames in time, it has been shown in the art that any arbitrary view of the scene between any two views may be created by linear interpolation of the flow vectors between two

Art Unit: 2671

consecutive images. This implies that even when the captured frames are coarsely sampled in time, an arbitrarily dense time sampling may be created by view interpolation. Once such a sampling is available, the creation of the mosaic is trivial as discussed above. Note that the densely sampled complete image frames need not be created but only the central slit of each frame.

While Hsu et al. Teaches most features claimed, it is noted that viewing rays are not explicitly taught. However, Hsu et al. teaches that in order for the mosaic to be coherent, points in the mosaic must be in one-to-one correspondence with points in the scene. Accordingly, given a reference coordinate system on a surface to which source images will be warped and combined, it is necessary to determine the exact spatial mapping between points in the reference coordinate system and pixels of each image, which teaching would have been obvious to one of ordinary skill in the art at the time of the instant invention to consider as viewing rays.

Claim 2 further requires one or more computer-readable media as recited in claim 1, wherein each portion comprises a slit image. Hsu et al. Teaches this at column 18 as discussed above for the rejection of claim 1.

Claim 5 further requires one or more computer-readable media as recited in claim 1, wherein the constant distance is different for each of a plurality of different portions of the scene. Hsu et al. Teaches a spherical mosaic at columns 13-14 which satisfies this requirement.

Claim 6 further requires one or more computer-readable media as recited in claim 1, wherein the combining comprises placing the selected and interpolated portions in a side-by-side arrangement to generate the view image. Hsu et al. Teaches this at column 18.

Claim 7 further requires one or more computer-readable media as recited in claim 1, wherein each of the plurality of viewing rays extends from a viewing point within a circular region defined by the mosaic. This is implied in a spherical mosaic.

Claim 8 further requires one or more computer-readable media as recited in claim 1, wherein the view image comprises a stereo image including a left eye view and a right eye view. Hsu et al. Teaches stereo images at column 17 with the teaching of : 5. With the global three-dimensional view transformations computed, next, at step 910, the routine computes dense depth/parallax maps with respect to the reference 2-sphere using the methods described in K. J. Hanna et al, "Combining Stereo and Motion Analysis for Direct Estimation of Scene Structure", Intl. Conf. Computer Vision, Berlin, May 1993, pp. 353-365.

6. Using the parameters and maps produced in the foregoing steps, the routine at step 912 generates a three dimensional spherical mosaic.

The above method can be used within the system of FIGS. 2 and 3 to construct a "stereo spherical mosaic" given the imagery to construct two or more spherical

Art Unit: 2671

mosaics as input (i.e., rather than use two dimensional processing in the iterative process, three dimensional processing is used).

Claim 9 further requires one or more computer-readable media as recited in claim 1, wherein the scene has been previously captured using one or more cameras.

Hsu et al. Teaches this at figure 2.

Claim 10 further requires one or more computer-readable media as recited in claim 1, wherein the scene is a computer-synthesized scene. Hsu et al. Teaches this at column 4.

Claims 15-17, 21-24, 28-34, 38-47, and 50 recite features similar to those previously addressed in the above rejections, and the claims are rejected under similar respective rationale.

5. Claims 3, 4, 11-14, 18-20, 25-27, 35-37, and 48-49 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Art Unit: 2671


6. Claims 51-57 are allowed.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Almis R Jankus whose telephone number is 703-305-9795. The examiner can normally be reached on M-F, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on 703-305-9798. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-6606 for regular communications and 703-308-6606 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4700.

AJ  
April 4, 2002



ALMIS R. JANKUS  
PRIMARY EXAMINER